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ABSTRACT

This pilot study explored teacher characteristics as they influenced the use of "Exploring Nepal," a cognitive learning-based interactive video system for middle school students. Specifically, the study sought to narrow down a variety of teacher characteristics that may influence the quality of their interaction with the videodisk. The initial list included psychological types (as measured by the Meyers-Briggs Type Indicator), number of years teaching experience, preferred teaching strategies, preferred learning mode, concerns with technology, and teaching philosophy. Five social studies teachers completed the Meyers-Briggs Type Indicator (Form G, self-scoring) and a background questionnaire prior to interacting with the videodisk. An electronic tracker monitored each participant's progress through the program. Follow-up measures consisted of a questionnaire and a structured interview asking about the projected use of the videodisk in the classroom, suggested implementation activities, and teacher perceptions of its potential. Findings indicate that the salient characteristics influencing teachers' interaction with "Exploring Nepal" are psychological types and previous experience with media (videocassette recorders in general and Macintosh computers in particular). Four dependent variables--amount of detail, linearity of selections, use of elaborative functions, and use of technical controls--were identified and quantified by the tracking mechanism and were used to refine the research questions. (11 references) (GL)

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RESEARCH ON TEACHERS' CHARACTERISTICS IN RELATION TO A COGNITIVE-LEARNING BASED INTERACTIVE VIDEODISC SYSTEM

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BACKGROUND

In the summer of 1987 at the Ohio State University, an R & D project was started to explore the possibility of repurposing existing instructional television for interaction. The following winter a team of five Instructional Design and Technology graduate students drafted the original design in an advanced interactive video seminar. The project has gone through several iterations in its movement from prototype to completed product. The result is a cognitive-learning based Level III Interactive Videodisc system called "Exploring Nepal." It is designed to teach middle school students about the country of Nepal, its people, its culture and the global problem of deforestation.

By design, certain features make "Exploring Nepal" uniquely rich for research purposes. The user, whether student or teacher, has both maximum control over the learning experience and, consequently, maximum responsibility for whatever learning occurs. The effort to maximize user-control is consistent with generative learning theory (Wittrock,1974), which emphasizes the learner's active participation in the learning experience, the construction of meaning, and the assumption of responsibility for learning. The transparent organization of the computer program allows the user to move easily through massive amounts of verbal and visual information. At all times, the design imperative is for the user to know where s/he is in relation to the whole program, how to get out, how to move to another area, and how to get back.

The flexible design accommodates several types of instructional strategies from the teachers' point of view, including single person use, small group use, and large group demonstration. In addition, it appeals to a variety of learning styles, from visual to verbal, from reflective to impulsive, from field dependent to field independent. The learning outcomes are as varied as the users allow them to be. This free-form instructional system is a-typical of

materials usually available to teachers, thereby suggesting numerous research questions.

The research described in this paper focuses on teachers' initial reactions to this innovative application of technologies. Specifically, the research question asks if there is a relationship between various characteristics of teachers and their reactions to "Exploring Nepal."

RATIONALE AND LITERATURE REVIEW

While instructional technologists have always known that teachers are a critical link to the utilization or lack of utilization of technologies in the classroom, teachers remain by and large a neglected area in the research in our field. The literature of teacher planning confirms what common sense suggests: that adaptability of materials to teachers' personal styles is a significant component in the decision to use (cf Cambre, 1985). The emergence of more and more complex technologies, coupled with the application of new theories of learning, makes understanding teachers even more critical. The research described in this paper is a necessary first step in exploring teacher characteristics as they might influence the decision to use and the quality of use of a cognitive-learning based interactive videodisc system. The expectations are that this research will shed light on the way these technologies should be introduced to teachers, as well as to provide alternative utilization strategies to fit a variety of teacher characteristics.

Those interested in teacher effectiveness have recently focused their attention on teachers' thought processes (Clark & Peterson, 1986) as a way to gain insight into the multi-dimensional array of teacher characteristics that affect the teaching-learning process. Peterson (1988) states further that "...teachers' thoughts, cognitions, judgment, thinking, and learning processes become important dimensions in studying the teacher and teaching and in determining what constitutes 'effective teaching'" (p.6).

Are there underlying psychological characteristics that help explain the thought processes, judgments, choices and projections

as teachers work through a complex new technology? There is considerable evidence that teachers' types as defined by the Myers-Briggs Type Indicator (MBTI), which describes 16 different types based on four scales measuring distinct personality characteristics, do affect the way teachers teach and what they prefer to teach (Lawrence, 1982). In subject matter preferences, one type prefers teaching theoretical courses, and the opposite type prefers to teach practical courses. One type prefers to teach in elementary and middle school grades, whereas both types contribute equally to the ranks of high school teachers. Type differences influence the way a subject is taught. One type seems to emphasize facts and concrete skills, while its polar type emphasizes concepts and relationships. One type is more likely to keep things centralized in the classroom and to limit student choices, whereas another type is more likely to move freely around the room and to allow student autonomy. We have no data at present about the relationship of teachers' types to the use of a Level III interactive video program.

Since teachers will interact with "Exploring Nepal" as novice learners, research on the choices in their learning path and relation to type preferences are germane to this study. Research shows that in an instructional environment one type likes to proceed orderly toward well-defined goals, prefers an established routine, works steadily, enjoys using skills already learned more than learning new ones. This type keeps accurate track of details, makes lists, and is good at precise work. The polar type dislikes doing the same thing over, becomes restless and impatient with routines, pays more attention to the whole concept than to details, and dislikes taking time for precision. (Kiersey & Bates, 1978). Type preferences in relation to media preferences of learners have also been catalogued. Golanty-Koel found marked differences between psychological types and mass media preferences of non-academic high school students. Specifically, she found that one type preferred television while another preferred reading. (Golanty-Koel, 1978).

The goal of research on type differences is that each type can profit from understanding one's own preferences and can learn how to cope with the opposite type. In an instructional situation,

teachers who are aware of their own and others' type profiles are able to relate to the varied type preferences of their students in order to improve the educational potential for each individual.

RESEARCH DESIGN

Purpose of the Study

The purpose of this study is to narrow down a variety of teacher characteristics which may influence how teachers interact with "Exploring Nepal." The initial list of teacher characteristics included psychological types (as measured by the MBTI), number of years teaching experience, amount of experience with VCR's and computers, preferred teaching strategies, preferred learning mode, concerns with technology, and teaching philosophy.

A qualitative research methodology seems appropriate as a first-step to isolate the salient factors which seem to impinge on how teachers differ in their approach to a new technology. Once those factors are isolated, then relational research would follow to pursue the question of whether the MBTI and/or other teacher characteristics are meaningful correlates with possible predictive potential.

Methodology

Sample. Five social studies teachers from central Ohio agreed to participate in this pilot study on an individual basis. They were asked to review "Exploring Nepal" as if they were considering its use in their classroom. They were told that the primary interview question when they're finished would be, "How, if at all, would you use 'Exploring Nepal' in your classroom, assuming you had a Level III interactive videodisc set-up like this in your room?"

Methods. Data were collected using questionnaires, electronic tracking, observation, and interviews. The MBTI (Form G, self-scoring) and a background questionnaire were mailed to participants

for them to fill out at their convenience, taking approximately one hour. At a prearranged time individual participants met the researcher at Ohio State and (1) interacted with "Exploring Nepal," approximately one-and-a-half hours, with the researcher observing and an electronic tracker keeping records on the computer, (2) filled out a post-questionnaire and (3) were interviewed. The last two follow-up activities took approximately one-half hour.

In the structured follow-up interview, recorded on audiotape, participants answered open-ended questions regarding the projected use of "Exploring Nepal" in the classroom, including suggested implementation activities, their concerns and their opinion of its potential. Participants were encouraged to express their thoughts and feelings freely, which, when appropriate, were explored for elaborated meanings. Total estimated time for participants was 3 hours.

Instrumentation. The Myers-Briggs Type Indicator (Myers & McCaulley, 1985) is based on C. G. Jung's theory of psychological types (Jung, 1921, 1971). It has a proven record of validity and reliability (McCaulley, 1981). Eight personality preferences help individuals understand themselves and their behaviors. Four functions--sensing, intuition, thinking, and feeling-- and four attitudes--extroversion, introversion, judging, and perceptive--describe each individual's type, which is reported on a 4 x 4 grid, totaling 16 boxes.

A background questionnaire and a follow-up questionnaire were developed, reviewed by experts, and continually refined during the pilot study. The structured interview and questionnaires were designed to contribute to an overall understanding of each participant's orientation to technology and its place in the educational environment. Consistencies and discrepancies were examined in an effort to tease out the salient factors involved in teachers' perceptions of technology.

An electronic tracker built into the computer program notes which screen is selected by the user and measures the amount of time on that screen before another selection is made. It creates a

"map" of user interface. In addition, observations are recorded by the researcher of instances when the computer timer was ticking but the participant was not interacting with the program.

Treatment. Because teacher reactions to "Exploring Nepal" are central to this research, it is necessary to describe the product in some detail so that the results are interpretable.

"Exploring Nepal" runs on a two-screen, interactive video system. The hardware configuration is a Macintosh computer with a hard disc drive hooked to a Pioneer videodisc player and monitor. Visuals on the videodisc include a 15-minute instructional television program titled "Why are Forests Disappearing?" and 11 minutes of outtake video from the Agency for Instructional Technology's Global Geography series, as well as slides, photographs, maps, and line drawings collected from a variety of sources. Nepali music occupies part of the second audio track. The computer program includes text, icons, graphics, maps, charts, and graphs.

The main menu presents four separate but integrated sections: Information about Nepal, A View from the Top, News at 11:00, and Videodisc Inventory. These are non-linear sections and independent of each other in terms of how or when they should be accessed. Two other functions, the Index and the Notebook, are available from each of these four sections. Each one will be described briefly:

Information about Nepal. Information about Nepal is a huge collection of visual and verbal information about the country of Nepal, accessed by pull-down menus and sub-menus in five major categories: People, Environment, History, Government, and Economics. There are three levels of depth the learner might pursue in perusing the database. At the first level the user finds general information about the five categories named above. At the second level the user might choose to find more information contained in any one of 8-10 sub-categories listed under the main categories. At the third level the learner might choose to pursue a sub-category further for more details on a given topic. Throughout the use of this

database file both the computer screen and the video screen are presenting complementary, relevant information.

A View from the Top. A View from the Top is a problem-solving simulated discussion held in the chambers of the ruler of Nepal, with the user wearing the crown. The topic of the discussion is the central question of the AIT video: "Why are Forests Disappearing?" The issues involved in deforestation are debated in council chambers by a special group of advisors to the ruler, and the ruler/learner is asked to choose from among several proposals discussed or to suggest his/her own course of action after considering the pros and cons presented. Final feedback is provided through newspaper articles appearing five years after the decisions were made.

News at 11:00. News at 11:00 is an editing function inviting the user to create personalized video programs by clipping and reassembling video images from the disc and by writing an original script to accompany the presentation.

Videodisc inventory. In this section the user has immediate access by topical menu to all of the visuals on the videodisc. The disc includes the AIT video mentioned earlier, 11 minutes of outtakes from AIT, and 378 slides.

Index. This section provides an alphabetized listing of key words which are linked to relevant cards in the Information section.

Notebook. The Notebook is a word processor which is available from all parts of the program. The student can keep and later print personal records while using the program.

RESULTS

During the pilot study the salient characteristics impacting teachers' interaction with "Exploring Nepal" were narrowed down to (1) psychological types (as measured by the MBTI), and (2) previous

experience with media, VCR's, computers in general, and Macintosh computers in particular. From the data generated by the tracking mechanism on the computer, four dependent variables were identified and quantified. They are:

1) Amount of detail refers to choices in "Information about Nepal" which include submenu selections, Scene Information, and Next Scene. Submenu selections are defined as choices which branch from a card. For example, the Topography card has three additional selections, Mountains, Hills, and Lowlands. Each of these three would be considered a submenu selection.

2) Linearity of selections gives higher points to linear selections, lower points for skipping around. There is no value judgment associated with high or low points. One is not necessarily better than the other. Linearity is defined as left to right, top to bottom, first to last. Each linear selection in "Information about Nepal" is given10 points. Each nonlinear selection is given -10 (minus 10) points. Selections are (1) the five main parts across the top, Environment, People, Economy, History, and Government, and (2) choices from the pull-down menus on each of those parts. If the user returns to a previously examined section (i.e., Simulation, News, Inventory, Information), s/he is given an additional -25 (minus 25) points.

3) Use of elaborative functions gives points for exploration of elaborative functions, such as choosing Challenge Questions in "Information about Nepal" (10 points), using the Notebook (10 points), and creating a "News Presentation" in the Editor (25 points).

4) Use of technical controls includes the selection of videodisc controls, like Stop/Pause, Play, Reverse, Fast forward, Fast reverse, Step-frame, Audio 1, Audio 2, and a dragbar to access the beginning, middle, end of the videodisc or anywhere in between.. It also includes selection of Technical information from the Main Menu, Help from the Editor, News at 11:00, and Information sections, and use of the Index. One point is given for each selection.

Further results of the pilot study are that the research questions for the dissertation research have been refined. They include the following:

I. Does psychological type, measured by MBTI, make a difference in the way teachers interact with "Exploring Nepal"?

A. Is there a relationship between E-I's, S-N's, T-F's, or J-P's and the amount of detail selected?
Hypothesis S's will select more detail than N's.

B. Is there a relationship between E-I's, S-N's, T-F's, or J-P's and the linearity of their selections?
Hypothesis S's will select in a more linear manner than N's.

C. Is there a relationship between E-I's, S-N's, T-F's, or J-P's and the use of elaborative functions?

D. Is there a relationship between E-I's, S-N's, T-F's, or J-P's and the use of technical controls?

II. Does previous amount of media use, VCR use, general computer use, or Macintosh computer use make a difference in the way teachers interact with "Exploring Nepal"?

Hypothesis More advanced users will select more detail, select in a more random style, use more elaborative functions, and use more technical controls, than beginner users due to their greater knowledge and comfort with media/VCR/computers.

A. Is there a relationship between amount of previous media/VCR/computer experience and the amount of detail selected?

B. Is there a relationship between amount of previous media/VCR/computer experience and the linearity of their selections?

C. Is there a relationship between amount of previous media/VCR/computer experience and the use of elaborative functions?

D. Is there a relationship between amount of previous media/VCR/computer experience and the use of technical controls?

IMPLICATIONS

It is hoped that research on teacher perceptions of new technology will enlighten teacher educators, educational technologists, school administrators, and teachers themselves so that appropriate workshops and inservice training could be developed to reflect explicit teacher concerns with new technology, as well as to provide alternative utilization strategies to fit the variety of teacher characteristics identified.

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